

## SUMMARY OF TORNADOES IN COLORADO, WYOMING, AND NEW MEXICO, 1916-51

A. W. COOK

Weather Bureau Airport Station, Denver, Colo.  
[Manuscript received August 19, 1952; revised April 3, 1953]

The infrequent occurrence of tornadoes in Colorado, Wyoming, and New Mexico, the western fringe area of the main tornado belt [1], makes the forecasting of them a difficult, and perhaps an impossible, problem. This summary is presented merely as a convenient source of pertinent facts concerning the distribution of tornadoes in these three States (the Denver Forecast District) and it is hoped it may be of some help in the public information program of weather stations in the district. The sources of data for the summary were the severe storm reports published in the Annual Reports of the Chief of the Weather Bureau (1916-34), Monthly Weather Review (1921-49), and Climatological Data—National Summary (1950-51).

As judged by property damage, there are few destructive tornadoes in Colorado, Wyoming, and New Mexico. This, of course, is a poor criterion for the severity or violence of a storm, especially in such a relatively sparsely populated area as these three States. A tornado occurring over open country and sighted from a distance might well be as violent, or more so, as one which just happened to wipe out most of a town. A tornado struck Julesburg, Colo., on June 6, 1947, and did an estimated \$350,000 to \$500,000 damage. This is by no means a common occurrence for in 36 tornado seasons only 11 tornadoes have been destructive enough to do estimated property damage of \$50,000 or more.

A tornado in the Denver Forecast District is a relatively infrequent phenomenon. The average number of tornadoes per "tornado season" (April through September) for the years 1916-51, inclusive, is 1.42 in Colorado, 1.58 in Wyoming, and 1.00 in New Mexico, or 4.00 tornadoes per season for the district as a whole.<sup>1</sup> It is interesting to note that in 36 seasons there were only 18 cases of more than one tornado on the same day. This is indeed unusual when it is considered that the district has a north-south distance of over 800 miles. On five of these days there were two tornado occurrences in the same area. In only eight cases were tornadoes reported on consecutive days anywhere in the Denver Forecast District. There is

only one case of record of tornadoes on consecutive days at one location, Buffalo, Wyo., on June 5 and 6, 1949, although Akron, Colo., reported a tornado on June 15, 1928, and on the following day Thurman, 35 miles south reported a tornado. Comparisons of multiple tornado situations seems to be meaningless in an area that is over 800 miles in north-south extent and has so few occurrences. No doubt many tornadoes go unreported because there is no damage. Very frequently tornado reports carry the statement "funnel did not touch the ground."

The distribution of tornado occurrences in Colorado, Wyoming, and New Mexico for April through September is summarized in the accompanying figures. Figure 1 shows the spatial distribution in the three States, tabulated by counties.<sup>2</sup> The bulk of the tornadoes occurred east of the 106th meridian in Wyoming and east of the 105th meridian in Colorado and New Mexico. Wyoming shows a concentration of occurrences in the southeast corner, corresponding to the concentration in the northeast section of Colorado. New Mexico shows no particular concentration except east of the 105th meridian the length of the State.

It is not surprising that so few tornadoes in this district are destructive. If the cities that are close along the mountains and very near the 105th meridian are excluded there are only two or three towns in eastern Colorado of 5,000 population or more and these are located in the irrigated sections along the Arkansas and South Platte Rivers. This same sparsity of population is evident in Wyoming and perhaps to a slightly lesser extent in New Mexico.

Figure 2 shows the yearly distribution<sup>2</sup> of tornadoes in the Forecast District for the period 1916-51. There have been 2 years during the past 36 years in which no tornadoes were reported during these months, while the greatest number reported in any year was 11 occurrences in 1923 followed closely by 10 occurrences in 1949 and 9 in 1951.

Figure 3 is a smoothed distribution of tornado occurrences by days designed to bring out the period of maximum occurrence. Tornadoes were tabulated by 5-day

<sup>1</sup> A total of only four tornadoes occurred in the district during the period October through March 1916-51.

<sup>2</sup> The totals of the spatial and yearly distributions differ by one because the place of occurrence of a tornado in September 1941 in Wyoming was not listed.

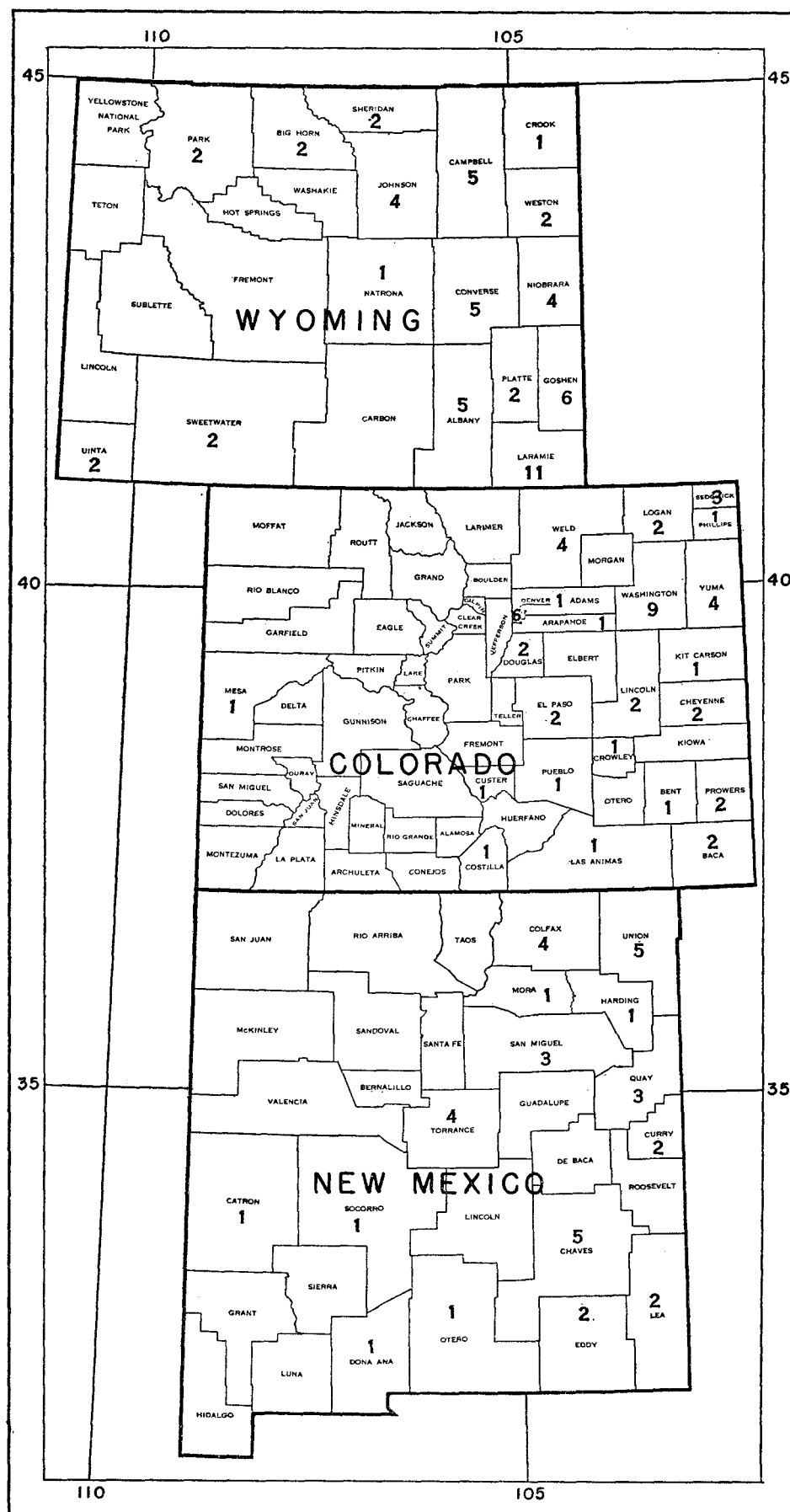


FIGURE 1.—Distribution by counties of tornadoes in Colorado, Wyoming, and New Mexico for the period April through September 1916-51.

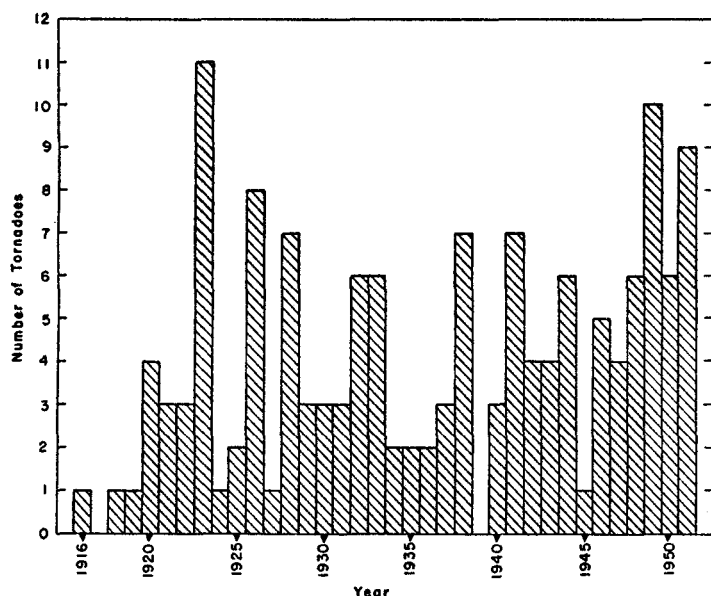


FIGURE 2.—Distribution by years of tornadoes in Colorado, Wyoming, and New Mexico, for the period April through September, 1916-51.

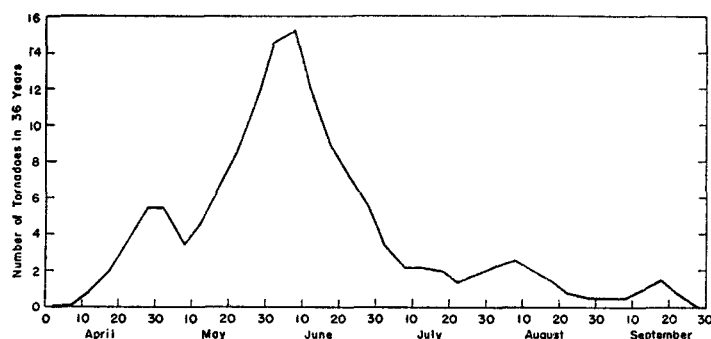


FIGURE 3.—Smoothed frequency distribution of tornadoes in Colorado, Wyoming, and New Mexico for 5-day intervals, April through September, 1916-51.

intervals from April 1 through September 30. These frequencies were then smoothed by successively overlapping three consecutive 5-day intervals (with frequencies  $a$ ,  $b$ , and  $c$ ) by the formula  $\frac{a+2b+c}{4}$ . These smoothed fre-

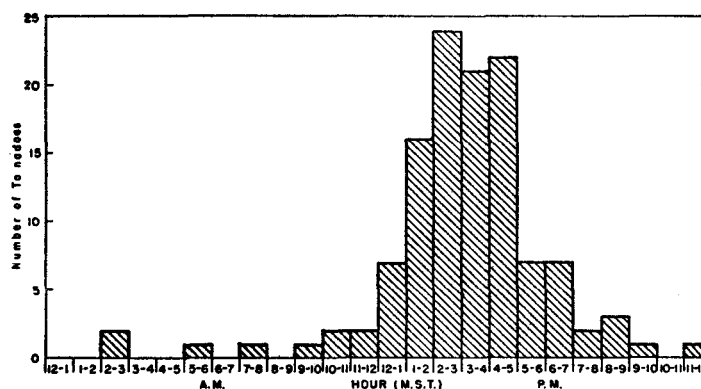


FIGURE 4.—Diurnal distribution of tornadoes in Colorado, Wyoming, and New Mexico, 1916-50. (Adapted from [1].)

quencies were then plotted at the midpoint of each 5-day interval in figure 3. This analysis brings out a very sharp maximum of occurrence for the District as a whole between the dates of June 5 and June 10. A similar analysis made for the individual States (curves not shown) shows the three State curves have essentially the same shape as the District curve, but with Colorado's curve peaking in the interval June 10-15 and the New Mexico curve peaking in the interval June 1-5.

Figure 4 shows the diurnal distribution of tornadoes for the three States combined, with the great majority of occurrences falling between noon and 7 P. M., MST. This, of course, corresponds almost exactly with the diurnal distribution of thunderstorms in this region [2].

#### REFERENCES

1. U. S. Weather Bureau, "Tornado Occurrences in the United States," *Technical Paper*, No. 20, Washington, D. C., September 1952, 43 pp.
2. U. S. Weather Bureau, "Thunderstorm Rainfall," *Hydrometeorological Report*, No. 5, Vicksburg, Miss., 1947, 330 pp.